

REMARKS

Applicants are submitting herewith a Second Supplemental Information Disclosure Statement to cite references found as result of an International Search Report of a corresponding PCT application.

Claims 1-18 are presently pending in this application, of which Claims 9-14 have been canceled. Claims 15-18 have been added herein. Support for these newly added claims is found, for example, on page 4, lines 1-14, page 14, lines 18-23, and page 21, lines 1-12. No new matter has been added.

Applicants have amended the specification to correct typographical errors. FIG. 2 has been marked up in red ink to correct a typographical error and is submitted for the Examiner's approval. No new matter has been added. Pursuant to M.P.E.P. §608.02(r), a separate Letter to Draftsman with pen-and-ink sketches is included with this Amendment.

Election under 35 U.S.C. §121

The Examiner has required an election between Group I (Claims 1-8 directed to a retroreflected structure) and Group II (Claims 9-14 directed to a method of forming retroreflective sheeting). Under 35 U.S.C. §121, Applicants elect Group I for prosecution in the present case. As indicated above, Claims 9-14 have been canceled herein.

Claim Rejections under 35 U.S.C. §102

The Examiner rejected Claims 1-3, 5, 7, and 8 under 35 U.S.C. §102(b) as being anticipated by Van Arnam (U.S. Pat. No. 4,243,618). The rejection is respectfully traversed.

The Examiner states that Van Arnam at column 7, lines 1-4 "discloses cube corner trigonal pyramids having a size of about 0.003 to about 0.015 inch along the side of the base of the pyramids. Thus, the center-to-center spacing between the apices of adjacent cube corner prisms would be in the range of about 0.002 ($=0.003 \times 2/3$) to 0.01 ($=0.015 \times 2/3$) inch."

Applicants respectfully submit that the Examiner's calculations are incorrect.

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A careful analysis of the geometry of cube corner prisms reveals that the length of the base of a prism corresponds directly to the pitch of adjacent prisms. That is to say, given that the prisms have equal length sides and that apices of adjacent prisms lie in parallel lines which are perpendicular to the end points of a side of a prism positioned between adjacent prisms, the length of the base corresponds directly to the distance between apices (i.e., center-to-center spacing). This is most clearly shown in FIG. 2 of the originally filed drawings. Accordingly, Van Arnem only discloses prisms being about .003 to about .015 inches on center.

Applicants respectfully submit that the claimed range of prisms (0.0005 to 0.003 inches on center) of Claim 1, and the claimed prism spacing (.0002 inches on center) is neither disclosed nor suggested by Van Arnem, or by any combination of the cited references.

The present claimed invention provides unexpected results of having essentially no change in the retroreflected brightness by the structure having prisms with a dihedral angle of 90° having a dihedral angle deviation in the range from -1.04 minutes to 3.67 minutes. This is attributable to the fact that there is greater diffraction spreading of the returned retroreflected light with the smaller pitched prisms. In contrast, the same dihedral angle of 90° having the same range of dihedral angle deviation in larger pitch prisms (e.g., .006" pitch) results in a change of fifty percent of the brightness.

This uniformity of retroreflected brightness of the present invention despite the dihedral angle deviation provides a number of immediate advantages including: allowing some latitude in the manufacturing process such that the prisms can be manufactured at much higher speeds and with less material; retroreflecting the same brightness despite distortion of the prisms due to temperature variations and the like; and allowing small pitched prisms with metal backing to satisfy the 0.5° angle of observation performance required for highway use.

Furthermore, the diffraction effect of the claimed smaller pitched prisms despite the dihedral angle change results in a uniform orientation-free retroreflected light resulting in a much safer product that do not leave dark areas in the retroreflected light distribution. In contrast, larger prisms return six well-collimated beams that do not converge leaving dark areas in a narrow observation angle, such as 0.5° , and, hence, an unsafer product.

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The claimed range of prisms, which is smaller than the cited prior art, provides a number of important advantages. The prisms are stressed less during manufacture and distortion of the structure. Also, the smaller prisms allow the total thickness of the structure to be reduced while increasing flexibility which is a very desirable feature.

Additionally, the claimed range of prisms beneficially avoids an undesirable scattering effect (i.e., the impinging light is not retroreflected by the prisms but rather scattered because the prisms are too small) that occurs in exceptionally small prisms.

Therefore, Applicants' claimed invention meets the requisites of 35 U.S.C. § 102.

Rejections under 35 U.S.C. §103(a)

The Examiner rejected Claim 4 under 35 U.S.C. §103(a) as being unpatentable over Van Arnem in view of U.S. Pat. No. 5,558,740 (the '740 Patent). The rejection is respectfully traversed.

Although the '740 Patent discloses the concept of seaming together several prism arrays, it does not provide the limitations of Claim 1 not disclosed in Van Arnem as described above. Thus, the two references combined do not teach all the limitations of Claim 4.

The Examiner rejected Claim 6 under 35 U.S.C. §103(a) as being unpatentable over Van Arnem in view of Walter (U.S. Pat. No. 5,171,624).

Although Walter discloses the concept of tilting cube corner elements, it does not provide the limitations of Claim 1 not disclosed in Van Arnem as described above. Thus, the two references combined do not teach all the limitations of Claim 6.

Therefore, Applicants respectfully submit that independent Claims 1 and 2 and dependent Claims 3-8 are patentable over the cited references, taken separately or in combination.

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SUMMARY AND CONCLUSIONS

Applicants have elected Group I (Claims 1-8) for prosecution in the present case. Further, Applicants' claimed invention is not anticipated by Van Arnam under 35 U.S.C. §102(b). Applicants' claimed invention is not obvious under 35 U.S.C. §103 in view of the cited references, either individually or in combination. Reconsideration and withdrawal of the rejection of the claims are requested.

If a telephone conference would expedite prosecution of this case, the Examiner is invited to call the undersigned.

Respectfully submitted,

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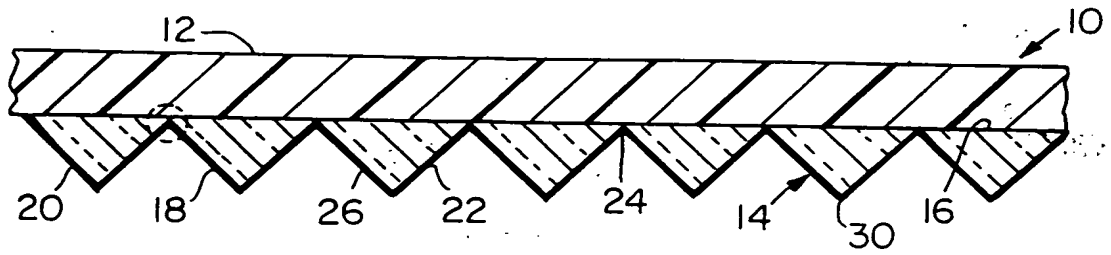


FIG. 1

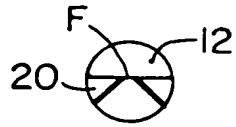


FIG. 5

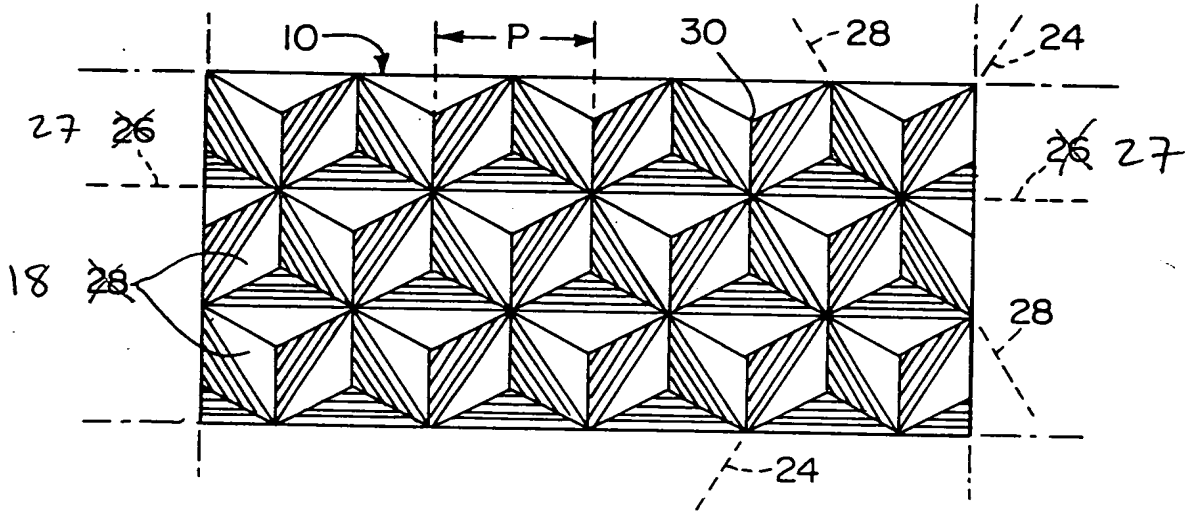


FIG. 2

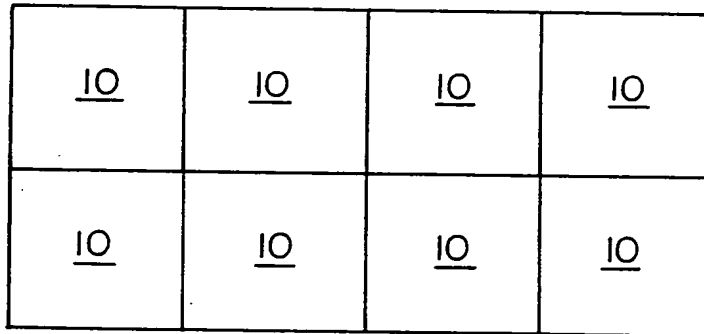


FIG. 3

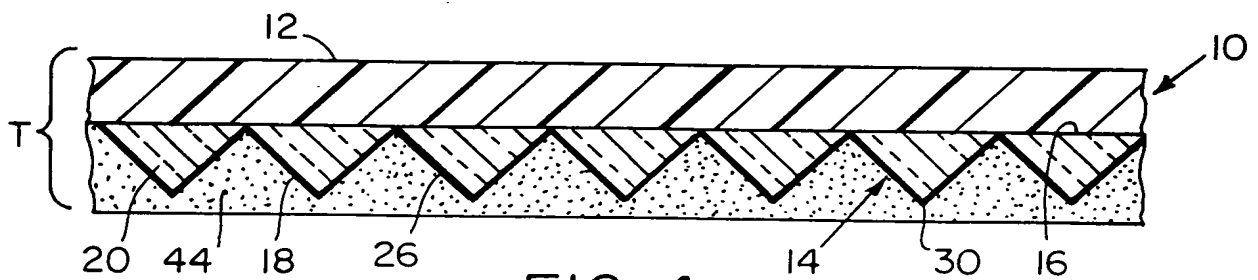


FIG. 4

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